no slurring between one sound and another, but clear jumps from one multiple to another, and every one of them may be arrested and heard by itself by checking the piston. But, although I am glad to produce this tube before those who were not present on the last occasion, and to do honour to the memory of our eminent vice-president, who declined to refer in any way to himself, I have another motive also. This is a principle which has never been utilised. We have had pipes stopped at the top, like the usual pitch-pipe, but they have been found too slow in action to be suitable for any other purpose. This is rapidity itself, and might surely be utilised for some such purpose as pedal-pipes for an organ. The piston can be balanced outside to the greatest nicety, and one such pipe will take the scale of C, and another that of F. All that is required is to blow across the top in the manner of the Pandean pipes, or, as it appears, better still, to set free a fan or cogged wheel at the mouth tuned to each of the two fundamental notes. The wheel might be set free by the action of the foot upon the pedal. It is now well known that the length of a 32 or a 16 foot pipe may be greatly reduced by breadth of scale. We Europeans have made little, if any, use of resonators, and yet they have been long in use in Java. The drawing on the wall is of an instrument brought from Java by Sir Stamford Raffles more than half a century ago. There is one of the same kind in the British Museum. But this is perhaps of greater interest, as it may have suggested to Wheatstone the *principle* of the resonating tube. The natives of Java cast metal plates which they suspend in a row upon strings, and strike them with drum-sticks, which are fitted into circular heads. As all cast metal is more or less false in tone, owing to inequalities and lack of homogeneity, they place some of the largest bamboos, cut to short lengths, and placed upright, under the metal to make the true sounds of these resonators to overcome the false harmonics of the metal plates.

Resonators were used in the theatres of ancient Greece—we here find them used in Java; but these powerful auxiliaries to tone still await their development in modern Europe.

And now, in conclusion, permit me to draw your attention to a harmonium with two keyboards, the upper one having four octaves of our scale tuned without tempering, and the lower with the five octaves of the harmonic scale, and the sixteen notes in the fifth octave. Much has been said of the harmonic scale, and this is perhaps the only instrument on which the harmonics can be fully heard and sustained for experimental use.

ROBERT SWINHOE, F.R.S.

WITHIN the last thirty years or so their respective vocations happen to have called two able lovers of natural history in the direction of the Celestial Empire—Mr. Robert Swinhoe, from England, and the Père Armand David, a Frenchman. The simultaneous investigations of these two biologists have added immensely to our knowledge of a country whose fauna not long ago was thought to be in no way interesting, because the huge population had succeeded in extirpating all the indigenous species. How far from the truth such an assumption is, has been demonstrated by the researches of the two naturalists above mentioned, the lamented death of the former of whom, at the early age of forty-one years, we recorded last week.

Mr. Swinhoe was born at Calcutta on September 1, 1836, and was educated at King's College, London, whence he matriculated at the University of London, in 1853. The next year he went, as supernumerary interpreter, to Hong Kong, being transferred to Amoy in 1855, and to Shanghai in 1858. In the same year he was attached to the Earl of Elgin's special mission to China, and afterwards to H.M.S. *Inflexible* as interpreter in a circumnavigating expedition round Formosa, in search of certain Europeans said to have been held in captivity at the sulphur mines on the island.

In 1860 Mr. Swinhoe attended Gen. Napier, and afterwards Sir Hope Grant, the Commander-in-Chief, as interpreter, and received a medal for war service. At the end of the same year he was appointed Vice-Consul at Taiwan, Formosa, and in 1865 to the full Consulship. In 1866 he was Consul, temporarily, at Amoy, and in 1868 went to explore the Island of Hainan. From May, 1871, to February, 1873, he was acting Consul at Ningpo, and at Chefoo until October of the latter year, when he had to retire from the service, on account of increasing paraplegia, from which he died on October 28 last.

Mr. Swinhoe was a Fellow of the Asiatic Societies of China and of Bengal, as well as of many other societies, having been elected into the Royal Society in 1876.

By far the majority of Mr. Swinhoe's scientific communications—fifty-two in number—mostly on the mammalia and birds of China, are to be found in the *Proceedings* of the Zoological Society of London between 1861 and 1874. Other papers appeared in the *Ibis* and the *Annals and Magazine of Natural History* within the same period. Among the most important of these are the "Catalogues" of the mammals and birds of China and its islands, in which are to be found descriptions of many new species of both classes, among which are St. John's Macaque (*Macacus sancti-johannis*), the Water Deer of Shanghai (*Hydropotes incruris*), the Mantchurian Deer (*Cervus mantchuricus*), the Orange-bellied Helictis (*Helictis subaurantiaca*), the Superb Flying Squirrel (*Pteromys grandis*), Boyce's Stork (*Ciconia boyciana*), together with a great number of other birds, for a complete account of which we cannot do better than refer our readers to a work upon the birds of China, by M. l'Abbé David and M. E. Oustalet, published at Paris a week ago.

Michie's Deer (*Lophotragus michianus*) is the name given by Mr. Swinhoe to a small deer from Ningpo, with antlers more diminutive than many other species. This, or a very closely-allied species, was previously sent to Paris by Père David, and described by M. A. Milne-Edwards under the name *Elaphodus cephalophus*.

Mr. Swinhoe, besides the collections which he made, was indefatigable and particularly successful in his endeavours to send living animals from China to this country, and there are many species, including *Cervus swinhoii*, *Hydropotes incruris*, and *Ciconia boyciana*, which were first procured by him.

It will be some time, we fear, before so enterprising a naturalist as Mr. Swinhoe takes up his residence in China, and employs every available opportunity for the prosecution of his favourite line of research.

DOUGLAS A. SPALDING

OUR readers must be familiar with this name as that of an occasional contributor to NATURE of thoughtful and acute articles in the department of mental science; they will be sorry to hear—but those who knew him will not be surprised—that Mr. Spalding died on October 31, at Dunkirk, just as he was preparing to go to the Mediterranean coast to spend the winter. Not much is known of Mr. Spalding's early life, but we are told by one who ought to know that his parents, belonging to Aberdeenshire, were in very humble circumstances, and that he was born in London about the year 1840. He himself spent his early years in Aberdeen as a working slater, doing his best to educate himself. By the kindness of Prof. Bain Mr. Spalding was allowed to attend the classes of Literature and Philosophy in Aberdeen University free of charge, in the year 1862. After that he got some teaching about London, and worked very hard to support himself, and even managed to keep his

terms as barrister, though he never practised. It was during this period of privation that he contracted disease of the lungs, from which he suffered greatly up to the time of his premature death. The first thing that brought him to the notice of the scientific world was his experiments on the instinctive movements of birds, which were first described at the Brighton meeting of the British Association in 1872, and published in *Macmillan's Magazine* for February, 1873. From a series of interesting experiments on chickens he showed that the only theory in explanation of the phenomena of instinct that has an air of science about it is the doctrine of inherited association. Instinct, he maintained, in the present generation of animals, is the product of the accumulated experiences of past generations. In another paper at the Bristol meeting of 1875 he communicated the results of further experiments, some described in NATURE, vol. viii. p. 289, bearing out still more strongly the conclusions he had already reached, and which he summed up in the statement that "animals and men are conscious automata." The Brighton paper brought Mr. Spalding into deserved repute. While travelling in France he became acquainted with John Stuart Mill, and through him afterwards with many other distinguished men, who all treated Spalding with great respect. Through Mill also, we believe, he became acquainted with Lord and Lady Amberley, with whom he lived as companion and tutor to their children from 1873 until the death of Lord Amberley. Mr. Spalding was appointed guardian to the children, but was ultimately compelled to withdraw from this office owing to his religious opinions, Earl Russell, however, allowing him to retain for life the salary settled upon him by Lord Amberley. For the last two years Mr. Spalding has lived mostly in the south of France, bearing his fatal and protracting illness with the greatest equanimity, regretting only his powerlessness to work and his enforced absence from London.

As to the value of his scientific work our readers having the material before them are able to judge. By his experiments on animals he did much not only to clear up the nature of what is called instinct, but also to shed a new light on certain mental phenomena in man himself. His papers in NATURE, mostly reviews of works connected with psychology, on the metaphysics of instinct and evolution—of the latter doctrine he was a warm advocate—were good specimens of clear and close reasoning. That he had a tender side to his character is evident from even his Association papers, and still more so from the interesting letters written by him to NATURE, last April, on the swallows and cuckoos at Menton. All who knew him felt that had his health permitted he would have added largely to scientific knowledge in the special department to which he had devoted himself—physiological psychology.

OUR ASTRONOMICAL COLUMN

THE SOLAR ECLIPSE OF 1878, FEBRUARY 2.—The eclipse of the sun in February next will be annular, but the central line passes at such high southern latitudes that the annular phase is not likely to be observed unless it be in the western parts of Tasmania near sun-set. Thus the central eclipse will commence in longitude 103° 0′ west of Greenwich, latitude 73° 8′ south, and will end in longitude 149° 25′ east, latitude 40° 58′, and the eclipse is central at noon in longitude 112° 27′ west, and latitude 84° 3′ south. Another point upon the central line is in longitude 145° 25′ east, and latitude 42° 25′, where the sun's altitude, however, will be less than 4°; this point lies on the west coast of Tasmania. Launceston is near the central line, but at the middle of the eclipse the sun at that place is almost in the horizon.

A large partial eclipse will be visible over the southern parts of Australia. At Melbourne it will commence at 6h. 1m. P.M. local mean time, at 120° from the sun's north point towards the west, and will attain its greatest magnitude 0·91, just before sunset, or at 7h. 4. At Adelaide the eclipse will begin at 5h. 44m. local time and will be greatest about 6h. 45m., when the magnitude will be 0·85, with the sun at an altitude of between 5° and 6°. At Perth, in Western Australia, the whole eclipse will be visible; greatest about 5h. 25m. local time, magnitude 0·66, with the sun at an elevation of 23°.

The next *total* eclipse of the sun visible in those parts of the earth will take place on the morning of September 9, 1885. At Wellington, New Zealand, the eclipse begins about a quarter of an hour after sunrise; totality commences at 7h. 42m. A.M., but continues only about forty seconds; in 175° 3′ east, and 40° 34′ south, on the central line, the duration of totality is 1m. 54s. It should be stated that these figures are founded upon the tables of Damoiseau and Carlini.

THE MINOR PLANET EUPHROSYNE.—It does not frequently happen that we have to look for a planet at 60° of north declination; such, however, will be the case at the end of the present year, and in the first days of 1878 as regards Euphrosyne, No. 31 of the group, which was discovered by Ferguson at Washington, on September 1, 1854. The planet will be in opposition on December 18, with the brightness of a star of the tenth magnitude. The following are its calculated positions when passing its greatest northern declination.

12h. Berlin M.T.	Right Ascension. h. m. s.	Declination. ° ′ ″	Distance from the Earth.
1877, December 31 ...	5 20 17·1 ...	60 2 56 ...	1·613
1878, January 1 ...	5 18 49·5 ...	60 2 59 ...	1·614
,, ,, 2 ...	5 17 24·1 ...	60 2 38 ...	1·618

The star L. 10067 in Camelopardus, which Lalande calls an eighth, and Argelander a seventh, will be a good guide for identifying the planet in this position. At midnight at Greenwich on January 1, by calculation, Euphrosyne will precede the star seven seconds in R.A., seven minutes to the south of it.

The latest elements of this body which, it will be seen, approaches much nearer to the pole of the equator than the generality of the small planets, are as follows, according to the computations of Mr. S. W. Hill:—

Epoch 1877, December 18 0 M.T. at Berlin.

	° ′ ″
Mean Longitude	90 10 23
Longitude of Perihelion	93 17 30
,, Ascending Node	31 33 23
Inclination	26 28 34
Eccentricity	0·222786
Semi-axis major	3·14902

COMETS OF SHORT PERIOD IN 1878.—Of the comets known to be performing their revolutions in periods of less than ten years, two are due in perihelion again in the ensuing year, probably within a few days of each other. According to Dr. von Asten's elements of Encke's comet at its appearance in 1875, the next perihelion passage, neglecting perturbation, would fall about July 27·0, which involves an apparent track in the heavens unfavourable for observation. In 1845, when the conditions were more nearly the same than at any of the comet's returns since its periodicity was first ascertained, only four observations were secured between July 4 and 14—at Rome, Philadelphia, and Washington. If the comet is not observed before the perihelion in 1878, while at a considerable distance from the earth, it may be found at the observatories of the southern hemisphere, after perihelion, or in the latter part of August, when it makes its nearest approach to us, although its distance at that time will not be less than the mean distance of the earth from the sun. The second comet, which is due in perihelion in 1878, is that discovered by Dr. Tempel on July 1, 1873. The period of revolution assigned by Mr. W. E. Plummer from observations extending to October 20, is 1,850 days; and the comet, neglecting perturbations